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Role of Students and Supervisors` Interaction in Research Projects: Expectations and Evaluations

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Abstract

The success of research projects largely depends on the interaction of students and supervisors. Purposes of the study were to identify the students' expectations of interaction; and to compare the subjective supervisors' estimates of students' research abilities with students' research abilities measured by objective indicators. A sample consisted of students (bachelors, masters, graduates) and supervisors from different faculties of St.-Petersburg State University. The questionnaire; content analysis; psycho diagnostic techniques for studying students' intellectual abilities and research potential, and 10-point assessment scales for supervisors were used. Students' expectations from supervisors were described. It was shown that supervisors' evaluations were often inexact and correlated more with external indicators of research activity of students than with their intellectual capacities. Necessity of focused work to improve the accuracy of the mutual understanding of students and supervisors was substantiated.

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Keywords: student; supervisor; the interaction; reseach project.

1. Introduction

In the last decade, many researchers in the field of educational psychology recognize the importance of the interaction of lecturers and students. The authors emphasize that modern teaching strategies are becoming increasingly oriented on students (Huba & Freed, 2000), students' involvement into the joint work with the lecturers contributes to the effectiveness of learning process (Frymier, 2005; Goodboy & Myers, 2008), and is positively correlated with higher academic achievement (Frisby & Myers, 2008).

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Consideration of students as active participants in the educational process caused the appearance of studies aimed at understanding of students' expectations and their perceptions of lecturers. Studies of the desired qualities of lecturers show that students prefer professors who throw an intellectual challenge to them, have the experience, and clearly explain not only the subject, but also how to achieve success in learning (Senko, Belmonte, & Yakhkind, 2012). Some researchers find out that students with a high level of satisfaction with training programs consider the ideal teacher to be able to adapt the learning content and arouse interest of students (Junquera, Mitre, & Perez, 2012). There are revealed differences in behavior of teachers-facilitators perceived by nursing students: they appreciate preceptors as more supportive while clinical lecturers are perceived as more important for development of critical thinking, reflection and exchange of experience between students (Kristofferzon, Mårtensson, Mamhidir, & Löfmark, 2013). It is essential that students were satisfied with all facilitators' supervision and their contribution to all learning outcomes. It means that students need different kinds of support from supervisors.

At the same time, the problem of supervisors' perception and evaluation of learning outcomes and capabilities of students is topical. Currently, psychologists agree that students' achievements are the result of systematic interactions between various cognitive and motivational variables (Sedaghat, Abedin, Hejazi, & Hassanabadi, 2011).The learning outcomes of students depend not only on their cognitive abilities and applied learning strategies, but also many motivational and personal factors, such as goals (motives) of students' learning activity (Elliott, 1999), students' perceived abilities (Green & Miller, 1996), individual difference in ego orientation (*desire for superiority*) and task orientation (*desire for understanding*) (Nicholls, Cheung, Lauer, & Patashnick, 1989), psychological sense of school membership (Ferreira, Cardoso, & Abrantes, 2011), and other various characteristics. And in turn, the development of students' skills in the creative and research projects improves their learning motivation and quality of work (Darinskaya, 2012).

The analysis of the scientific literature showed that students' expectations and issues of evaluating of students' achievements in traditional learning activity are mainly described. But an important role in modern education belongs to research activity and involvement of students in the joint research projects with supervisors.

The research activity differs from the traditional learning activity. It aims to get new scientific knowledge through finding and analysis of scientific information, formulation of research questions and hypotheses, data collection and processing, reflection and representation, etc (Poddyakov, 2000). We can assume that at every stage of research project students expect from supervisors certain types of support and incentives: motivation to begin the study, positive, but critical feedback, algorithms and explanation of research operations, and assistance in analysis and interpretation of the data, etc. The complexity of tasks and requirements for students increases on each subsequent stage of education (bachelor, master, graduate). Therefore, supervisors` evaluation of students` research capacities, including a whole range of motivational, cognitive, behavioral and self-organizational characteristics becomes very important. As all these characteristics may appear ambiguous or be only potential, a supervisor has to solve a very difficult problem. Underestimation or overestimation of research capacities of students by a supervisor could reduce the effectiveness of their interaction. For example, it was shown that character of motivation which encourages students to interact with lecturers could be ambiguous. Mottet, Martin, & Myers (1999) identified functional, social motives, motives of participation, "extenuating" and "slavish subservience" motives of students' communicative behavior, among which only a functional motive is directly related to the learning course. We found out that research activity of students, along with intrinsic motives, leading to high quality of work, can also be encouraged by students' values (Iskra & Moskvicheva, 2014), the motives of social achievements, personal development, and obligation, which stimulate them to look for easier ways of completing tasks (Moskvicheva, 2012).

Personality features of students could also be predictors of success of their researches. High level of research potential of students is positively correlated with extraversion, self-control, emotional stability, expressiveness, as well as the personality orientation to the future (Bordovskaia & Kostromina, 2013). Maturity of goal-setting processes, forecasting, self-reflection largely determines the promptness of completion of different kinds of students` work (Kostromina, 2013), and its incorrect assessment by supervisors could lead to unexpected students` procrastination.

Essential to the successful solving of research tasks are cognitive intellectual and creative abilities, defining the level of analytic-synthetic activity of students: the ability to distinguish common features and properties of objects or concepts, to compare, to think abstractly, to operate the knowledge; preference for an analytical thinking style, flexibility of thinking, etc. (Darinskaya & Rozum, 2014). Could supervisors accurately assess these abilities of

students?

Finally, we emphasize that successful communication in a research project leads not only to decision of a particular scientific problem, but has the important influence on the further personal and professional development of students. According to Ulug, Ozden, & Eryilmaz (2011), the influence of attitudes and style of teaching is usually studied in terms of the impact on students' academic achievement, whereas outside the research long-term consequences of the influence on the formation of personality remain. In their study of students from different departments of Istanbul Kultur University and Maltepe University it is shown that positive attitudes of university professors have a positive influence on the personal development of students and their life performances. In this sense, research activity has an even greater impact on the personal development of students, as it implies independence, development of a research position, responsibility for results.

Thus, research activity is specific in its content and requirements for the students, and is very important for their personal and professional development. For successful communication in the research project it is necessary for supervisors, first, to understand the needs of students in the specific types of support at different stages of research projects, and secondly, to evaluate accurately students` research potential. Misinterpretation of students` motivation can lead to inadequate ways of interaction and encouragement of students, underestimation of cognitive abilities can end up with the fact that supervisors will not provide students with the necessary level of independence, and revaluation can bring about low-quality implementation of research projects. Then there is the question of how exactly university lecturers can identify research possibilities of students.

The research questions of the study are:

- What are the differences in young researchers' (bachelors`, masters`, graduates`) expectations from interaction with supervisors?
- How do supervisors assess the potential research abilities of students?

The purposes of the study are to identify expectations of interaction of students of different levels of study; to compare the subjective supervisors' estimates of students` research abilities with students' research abilities and their implementation measured by objective indicators.

2. Methods

The study was conducted in two stages. In pilot survey 75 bachelors, masters and PhD students of different faculties St. Petersburg State University were involved. Research tools for main study were formed on the base of content analysis of the pilot data. The main study was conducted at the Faculty of Philosophy of St. Petersburg State University. The sample consisted of 95 students and 28 supervisors: 35 students were 4th year bachelors (mean age 20.44±1.2), 40 students were 2nd year masters (mean age 23.12±.5), and 20 were PhD students (mean age 28.36±3.7).

Instruments. To identify students` expectations from supervisors and students' attitudes toward research projects, we used the questionnaire for students, the same form for all levels of study. Data were analyzed by content analysis. To identify the accuracy of supervisors' evaluations, we used techniques package that was offered to 2nd year masters and their supervisors. As the objectively measured research abilities of students we used selected indicators: students' research potential and its components were studied with The Research Potential Inventory, developed in St.-Petersburg State University (Bordovskaia, 2013; Bordovskaia & Kostromina, 2013); students' cognitive abilities were studied with The Armthauer Intelligence Structure Test, IST, an adapted form, and The Reflexivity of thinking questionnaire by Karpov (2003). Masters also completed a questionnaire taking into account a number of their publications, participation in conferences and research projects. Supervisors were asked to evaluate students` research abilities and their degree of implementation of research potential with two 10-point scales (0 - very low research ability /very low degree of implementation, 10 - very high research ability /very high degree of implementation).

SPSS-20 was used for data processing. We used descriptive analysis, Chi-Square criteria, and Spearman correlation analysis to evaluate the study objectives.

3. Results

3.1. Analysis of students' expectations from supervisors

According to the results of the questionnaire, 22.9% of bachelors, 25% of masters, and 45% of graduate students "continuously participate" in different types of research activity; 65.7%of bachelors, 70% of masters, and 54% of graduate students "sometimes participate"; 11.4% of bachelors, 5% of masters, 1% of graduate students "do not participate".

Among the university environment factors, that encourage them to participate in research projects, bachelors mentioned primarily the regulatory requirements for conducting a research work (34.4%), co-group students' participation in research projects (13.2%), the interaction with the supervisor (12.9%, in percentage of total amount of bachelors' answers). Masters also noted the regulatory requirements for conducting a research work (25.7%), but also important for them was the interaction with the supervisor (23.9%) and the possibility of monetary rewards for their participation in the study (21.4%, in percentage of total amount of masters' answers). Masters underlined the necessity of the research project for the society (9.4%), collaboration with other research centers (8.2%) and the good university conditions for research work (7.9%). Graduate students mentioned the interaction with the supervisor and other members of the research project as the most important factor that prompted them to participate in the project (36.3%). In addition, it is important for them to collaborate with other research centers (18.1%), the monetary reward for their participation in the project (17.6%), university conditions for carrying out research (11.7%), and regulatory requirements for conducting a research work (11.2%, in percentage of total amount of graduates' answers). Differences between bachelors and masters did not get statistical significance, both groups were significantly different from graduate students (χ^2= 35.826, p=0.00; χ^2= 21.45, p=0.018, respectively).

Thus, *the interaction with the supervisor* for students of all levels of study is one of the most important motivators of participation in a research project. However, the content of the interaction is described in different ways. Bachelors and masters told about the supervisor's support, prompting, and even "pressure" from him. Masters often pointed out the personal interaction with the supervisor. Graduate students noted the impact of the scientific atmosphere in the research group, the personal interaction with supervisors ("favorable academic atmosphere", "supervisor's personality", "support of the supervisor").

Bachelors and masters were asked to estimate on 10 point scale the attractiveness of different stages of the research project to them, and to specify the prevailing emotions. We described averaged results for two groups because there were not significant differences. Students assessed very highly the stages "Reflection - awareness and analysis of the process and the result of work, the reasons for success / failure of study" (M 7.30±1.96) and "Analysis and interpretation of data" (M 7.12 ±2.35). They rated slightly lower the stage "Empirical data collection, primary systematization of the data" (M 6.70 ± 2.58.). The stages "Orientation in the scientific field for research" (M 6.32 ± 2.28) and "Identifying scientific problem, goal and research questions" (M 6.03 ± 2.41) were evaluated lower than previous ones. The lowest ratings were given to the stages "Planning a sequence of research tasks and actions" (M 5.52±2.09) and "Determination of research tools, selection and substantiation of methods and techniques" (M 4.85±2.01). It can be assumed that students estimated lower those stages of the research work which caused difficulties. As can be seen from the data, for bachelors and masters those stages were primarily ones associated with task scheduling and selecting methods and techniques, as well as the stages related to the analysis of scientific challenges. Difficulties of students and, therefore, their need in supervisor's assistance are confirmed by the data about the emotions experienced by them at different stages of the research project (in percentage of total amount of emotions listed for each stage):

- "Orientation in the scientific field" - interest (28.2%), inspiration (17.95%), enthusiasm (15.38%), curiosity (12.8%), concentration (12.8%), tension (5.12%);
- "Problematization" - interest (39.4%), tension, stress (15.2%), excitement (12.1%), curiosity (12.1%), enthusiasm (12.1%);
- "Determination of methods and tools" - tension (22.6%), boredom (22.6%), concentration (19.4%);
- "Planning" - interest (20%), concentration (20.0%), tension (16.7%); curiosity (10.0%), inspiration (10.0%);
- "Data Collection" - excitement (31.8%), curiosity (15.9%), interest (11.4%), enthusiasm (11.4%);
- "Analysis" - tension (21.1%), interest (18.4%), curiosity (15.8%), inspiration (15.8%), concentration (13.2%);

- "Reflection" - satisfaction (50.0%), pleasure (20.0%), curiosity (16.7%), inspiration (6.6%).

Thus, alongside with positive emotions accompanying the research activities masters and bachelors experienced tension and ambivalent feelings, reflecting their self-doubts and uncertainty in correctness of the work. It is more typical for stages associated with the definition of a scientific problem, the selection of research methods and planning of the work, analysis of the obtained data. These are the stages of the research project where students especially need the supervisor's help.

What kind of support would students like to get from the supervisor? We asked them to answer this question in a free form. Results of content analysis are presented in *Table 1* (in percentages of total amount of utterances by students of each level of study).

Table 1. Expected by students kinds of supervisor's guidance in the research project, %.

Kinds of supervisor's guidance	Bachelors	Masters	Graduates
Consulting on theoretical issues	17.28	21.39	26.18
Consulting on research methods and techniques	19.35	18.22	15.26
Providing guidance in accordance with the research theme	14.59	17.19	18.53
Orienting on obtaining the necessary knowledge and skills	14.37	13.24	6.91
Watching on timeline for research stages	11.31	6.21	5.31
Evaluating the work in according to the requirements	9.58	12.29	13.36
Assisting in interpreting the results	13.52	10.11	12.14
No need	0.0	1.35	2.31

As can be seen from Table 1, students of all levels of study expect primarily counseling on theoretical and methodological aspects of the study: in the sum percentage of such answers was 36.63% for bachelors, 39.61% for masters and 41.44% for graduates. On average, about 16.8% of the students expect the supervisor to guide their work within the target themes and achieve the goals. On average, 11.92% of students expect supervisor's assistance in understanding and interpretation of the results.

Students also expect the supervisor to orient them to obtain the missing knowledge, skills, to monitor the timeliness of doing the work, to evaluate it, and to give feedback as constructive criticism. However, these expectations are different for students of different levels of study (all differences are significant at the level $p \leq 0.05$). For bachelors and masters it was more important than for graduate students to be oriented by the supervisor to acquire the knowledge and skills necessary to execute the project. Bachelors expect the supervisor to monitor the timeliness of their work more frequently than students of other levels of study. For masters and graduate students it is more important than for bachelors to get supervisor's evaluation and constructive criticism of the work.

3.2. Analysis of the supervisors' evaluation of the research abilities of students

Supervisors` average value of research capabilities of masters was 7.74± 1.36 (min 4, max 9), average value of implementation of students 'research abilities was 7.73 ± 1.76 (min 3, max 10).

Table 2 presents the results of correlation analysis of the interrelations between the supervisor's assessments and research abilities of students. Measured indicators of research abilities were: 1) abilities required for the research activity; 2) objective indicators of student's success in research work - the number of published scientific papers, presentations at student's conferences and participation in research projects.

Supervisor's evaluation of research abilities of masters was not correlated with the overall level of research potential of students (RPI), and indicators of cognitive, motivational and behavioral scales of questionnaire RPI, taken separately (example with the scale of cognitive abilities is presented in Table 2). Supervisor's evaluation was not correlated with the level of verbal intelligence (IST) and other measured student abilities that are not represented in this table. Supervisor's evaluation of research abilities of masters was correlated with how, according to the supervisor's opinion, masters realize their research potential ($r=0.543$, $p=.000$) and with the number of publications.

Table 2.Correlation between supervisor's evaluations and research abilities of students

Supervisor's evaluation	Research abilities of students	r	p
Evaluation of research abilities of students	Research potential (RPI)	.258	.108
	Scale of cognitive abilities (RPI)	.270	.092
	Verbal intelligence (IST)	.146	.369
	Number of publications	.363*	.021
	Participation in conferences	.304	.057
Evaluation of the implementation of student's research potential	Verbal intelligence (IST)	-.338*	.033
	Analysis of the problem (1st subtest, IST)	-.331*	.041
	Number of publications	.313*	.049
	Participation in conferences	.327*	.040

Supervisor's evaluation of the implementation of the research potential of the master was positively correlated with participation in conferences and the number of student's publications. At the same time this evaluation was negatively correlated with scores on the 1st subtest, IST (problem analysis and actualization of information that can be used to solve it), and with overall verbal intelligence score on the Armthauer Intelligence Structure Test, IST. In other words, we can assume that supervisors rely more on external indicators such as participation in conferences, publications, than on the characteristics of cognitive abilities of masters.

It is important to note the reverse relations between reflexivity of masters and their participation in research projects ($n = 26$; $r = - 0.45$, $p = .021$). Active participation in research projects is inherent to masters with lower levels of reflexivity. Perhaps this fact shows that masters with high reflexivity are more demanding to themselves, and they are not sure that they can cope with the research tasks. It also confirms the necessity of supervisor's support of students at the stages, difficult for them, and positive critical feedback during the project.

4. Discussion

Analysis of students' expectations showed that the supervisor`s support is one of the most important factors that motivate students of all levels of study to participate in research projects. The most demanded kinds of the supervisor's assistance for all students are consultations on the theoretical aspects of the project (discussion of novelty of project themes, goals, and objectives, as well as methodological foundations of study); discussion of research methods and feasibility of using particular techniques; monitoring and evaluation of the work; constructive criticism from the supervisor; assistance in interpreting the results. Analysis of difficulties of bachelors and masters during executing the project showed that the greatest complexities and emotional tension are inherent to stages related to the determination and acquisition of research instruments, as well as planning the sequence of research tasks and actions (especially for bachelors).

Thus, in interaction with bachelors, along with the support in understanding of the theoretical foundations of the project, the supervisor should systematically monitor the acquisition of research tools by students and timely execution of tasks; orient the students to the obtaining of necessary knowledge and skills. For masters and especially for graduate students the necessity of control of timeliness of the work reduces, but the role of scientific support (including discussion of the theoretical foundations in accordance with the research purpose) arises. Masters and graduate students also need systematic feedback from the supervisor to confirm the correctness and the timely correction of work.

Overall, supervisors highly appreciate the research potential of students and the degree of its implementation. However, there were not revealed significant correlations between supervisors' evaluation of research potential of the students and indicators of students' research abilities measured by diagnostics instruments which were used in our study. Supervisor's evaluation of the implementation of students' research opportunities was negatively correlated with their cognitive abilities. At the same time we received positive interrelations between the supervisor's evaluation of scientific research potential of a student and the external manifestations of his research activity - participation in conferences and the number of publications. In our opinion, this fact points to the gap between the external manifestations of research productivity and real research possibilities of students. Possibly due to lack of support and necessary kinds of assistance from the supervisor students with high research potential are not

able to realize it, and even are afraid to participate in a research project because of high demands to themselves and low assessment of their own capabilities. It is also confirmed by obtained negative interrelations between reflexivity and active participation of students in research projects. At the same time, the study found out that supervisors in their evaluation of research abilities of a student were more focused on the external signs, reflecting the degree of activity of the student in the self-presentation; supervisors were often inexact in perception of student's abilities, in particular cognitive ones.

Thus, there is necessity of special work with supervisors aimed to improving the effectiveness of their interactions in research projects. This work can include educational seminars and trainings, which orient the supervisors to specific support of students of different levels of study in executing research projects.

5. Conclusions.

On the basis of findings training programs for educators focused on improving the efficiency of interaction with students through better understanding of students' needs and expectations and using of special techniques for evaluation research potential of students were developed. Considering the results supervisors can recommend students to use the techniques of time management and self-organization.

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